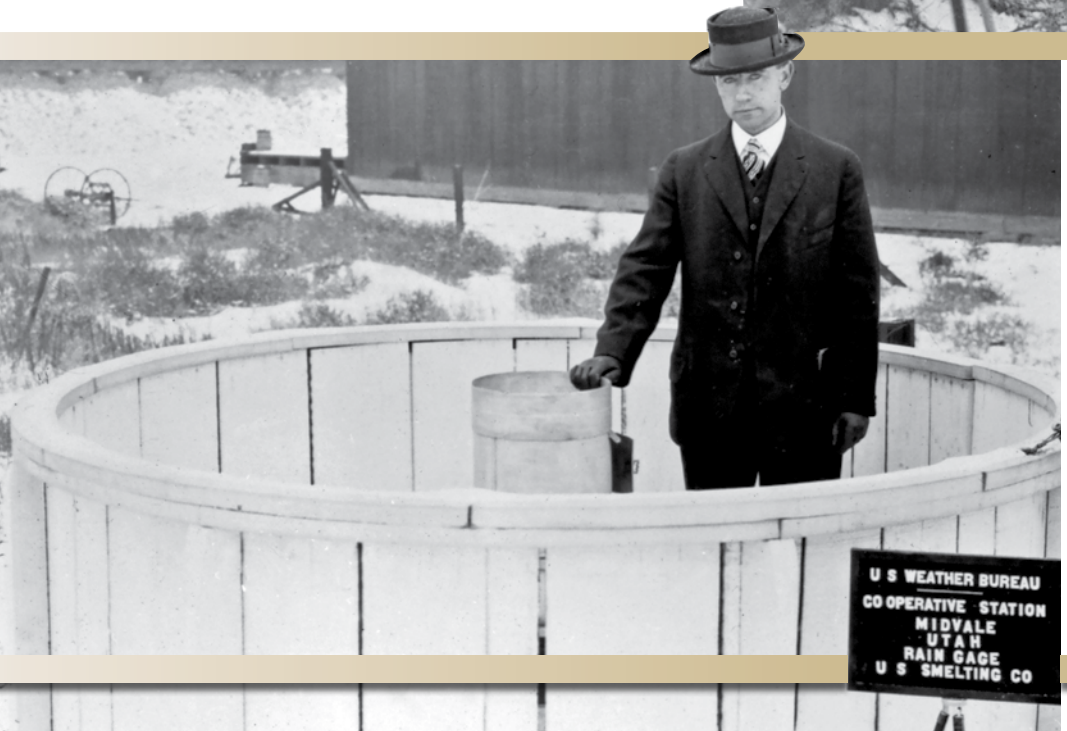
COOPERATIVE WEATHER PROGRAM:
DEDICATED VOLUNTEERS WATCH THE WEATHER

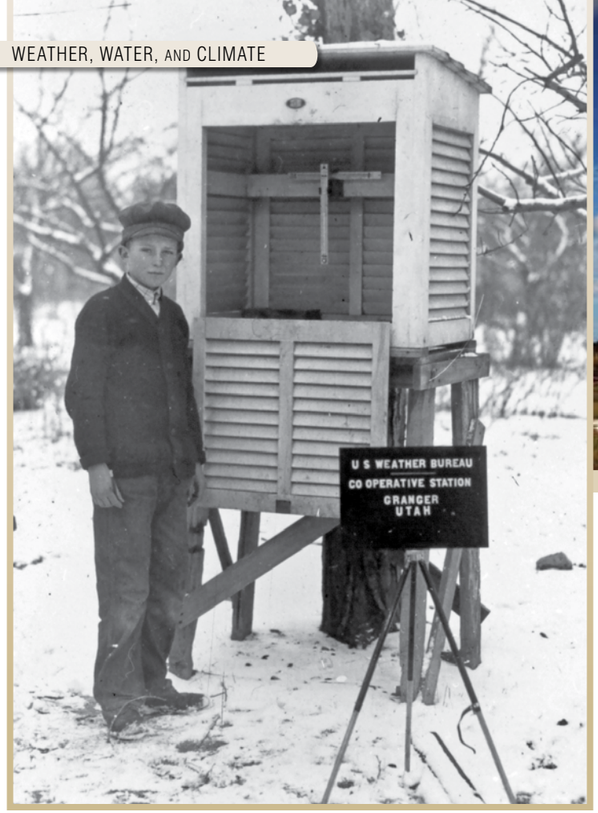
BY BARBARA STAHURA

While NOAA's National Weather Service (NWS) employs highly-skilled scientists and technology specialists, the NWS could not do its job as well as it does without the efforts of more than 12,000 volunteers around the country: the Cooperative Weather Observers, or COOP. COOP observers willingly dedicate time every day to measuring and recording maximum and minimum temperatures, snowfall, evaporation, soil temperatures, and 24-hour precipitation totals — together spending an estimated million hours per year — to contribute to the accuracy of the nation's weather forecasts. From farms and cities, suburbs and seasides, valleys and mountains, observers record their local data and transmit it to the NWS by phone, email, or mail.

COOP observations are a vital link in NOAA's efforts to protect lives and property in case of severe weather. NOAA's NWS has issued severe weather warnings based on information from volunteers. Furthermore, the most definitive source of climate data in the United States comes from the COOP network, given its many years of operation (since 1891), high density across the country, and large number of rural stations not affected by urban "heat islands." This climate record increases in value with time and is essential to climate-change research. These millions of measurements are used not only for understanding droughts and floods, heat waves and cold



Top: The rain gauge at the cooperative weather station at Granger, Utah, circa 1930. Left: The rain gauge at the U.S. Smelting Co. cooperative weather station in Midvale, Utah, circa 1930. *Credits: NOAA Central Library Photo Collection*



Left: A cooperative weather station at Granger, Utah, circa 1930. Volunteers observed temperature, precipitation, sky conditions, etc. *Credit: NOAA Central Library Photo Collection* **Above: The NOAA weather station at the Shuttle Landing Facility's midfield on NASA's Kennedy Space Center in Florida.** *Credit: NASA Kennedy Space Center (NASA-KSC)*

spells but also for agriculture, engineering and architecture, utilities planning, environmental impact, litigation and insurance purposes.

Weather Observer Stations

When Congress established the Weather Bureau, the predecessor of NOAA's NWS, in 1890, that law included the formation of the weather observer program, which was meant to define the climate of the United States for agricultural assistance. By the next year, 2,000 weather stations staffed by volunteers had been established around the country.

There are different types of cooperative weather observer stations, grouped into networks.

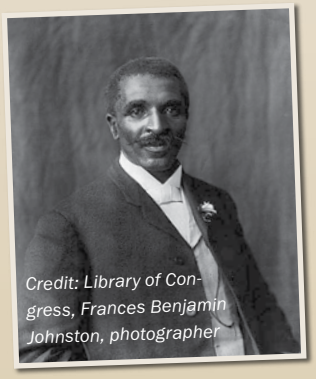
- The "a" network is the most basic, supporting NWS climate records, with the minimum task of observing daily minimum/maximum temperatures and 24-hour precipitation totals.
- The "b" stations primarily support NWS hydrologic programs such as flood forecasting, water planning, and water supply. These stations report 24-hour precipitation, river or lake levels, high and low temperatures, the water equivalent of snow, evaporation, and soil temperature as applicable.

WEATHER WATCHERS HONOR ROLL

Many people — whom today we might call "weather buffs" — were watching the skies, measuring rainfall, and recording temperature long before Congress formally established a weather observation network in 1890. The first known weather observer in the American colonies was the Swedish clergyman John Campanius Holm, who regularly recorded the weather in what is now Delaware in 1644 and 1645. In 1776, Thomas Jefferson began recruiting volunteer weather observers in Virginia, and within four years, observers were also volunteering in five more states (Jefferson's personal weather observations stretched across 40 years). Jefferson contemporaries George Washington and Benjamin Franklin were two more famous weather observers.

Some more recent COOP volunteers have attained very long terms of continuous service. Edward H. Stoll of Elwood, Neb., observed for 76 years; Earl Stewart of Cottage Grove, Ore., 75 years; and Ruby Stufft of Elsmere, Neb., 70 years, the woman with the longest service as a COOP observer. All of them, now deceased, have COOP awards named in their honor. One long-time COOP volunteer is still at his station. When Richard Hendrickson took his first reading for COOP, Herbert Hoover was president. The year was 1930, and twice a day, every day since then, the Bridgehampton, Long Island, farmer has chronicled the nation's climate from his COOP station. (See sidebar on George Washington Carver as a voluntary weather observer on page 51.)

GEORGE WASHINGTON CARVER:
VOLUNTEER WEATHER OBSERVER


Credit: Library of Congress, Frances Benjamin Johnston, photographer

BY DORIA B. GRIMES

In addition to creating hundreds of new uses for peanuts, soybeans, sweet potatoes, and cow peas, George Washington Carver served as a voluntary weather observer for the U.S. Weather Bureau. From November 1899 through January 1932, he dutifully completed W.B. Form 1009 in triplicate at Tuskegee University by recording the daily minimum and maximum temperatures, precipitation, wind direction, and day descriptions. He mailed these monthly to the Alabama Section of the Climate and Crop Service of the Weather Bureau, a part of the U.S. Department of Agriculture until 1940.

A review of the correspondence between Carver and the Weather Bureau indicates that his diligence was not accepted without question. For example, in a letter dated Nov. 7, 1905, Alabama Section Director F. P. Chaffee wrote to Carver, "It is thought maximum entry of 44 degrees on the 8th was inadvertently substituted for 74 degrees ... ."

Another example is on Feb. 13, 1920, when Weather Bureau Meteorologist P.H. Smyth wrote to Carver, "... on several dates there are marked discrepancies in hour daily temperature values as compared with surrounding stations. For instance, on January 25th your maximum temperature is recorded 78; at Montgomery it was 48; at Auburn 68 ... ."

Accuracy of weather data is essential, and NOAA's National Weather Service can be depended upon to review and correct all data submitted by voluntary weather observers, now called "cooperative weather observers" — all 12,000 of them.

Scanned images of George Washington Carver's handwritten weather reports including corrections in red by the Weather Bureau can be found at: http://docs.lib.noaa.gov/rescue/gw_carver_tuskegee/data_rescue_tuskegee_observations.html.

• When a station supports both climatic and hydrologic programs, it is considered an "ab" station.

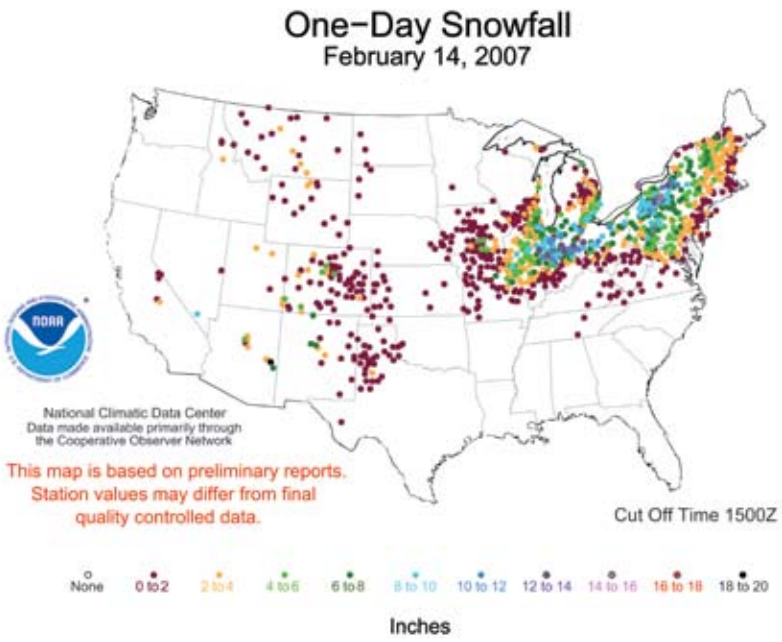
• Finally, a "c" station supports NWS meteorological programs, such as the issuance of warnings, forecasts, and public service, as well as the same observations as the other networks.

All the stations use standardized equipment, approved by NWS. Two types of thermometers can be used, the older Cotton Region Shelter or the newer Maximum/Minimum Temperature Sensor. Both shelter the thermometer but still allow accurate readings. Precipitation is measured with either the Fisher & Porter rain gauge or the 8-inch standard rain gauge.

While there are volunteer observers at most of the stations, about 1,000 stations are Automated Surface Observing System (ASOS) stations located at large airports. ASOS reports are available hourly, as opposed to weekly or monthly, and are used for immediate forecasting. However, because ASOS stations have often been relocated at their airports and since they are often affected by urban "heat island" influences, their long-term data is not as stable as that provided by volunteers.

The NWS has embarked on a plan to modernize the COOP volunteer networks and ASOS in order to meet demand for higher density, real-time weather, and climate data. The modernization will include replacing obsolete equipment and upgrading the network by filling in gaps in reporting coverage to improve data accuracy and availability.

Cooperative Weather Observers — www.weather.gov/om/coop



A map displaying the amounts of snowfall for different U.S. locations on Feb. 14, 2007. The data depicted on this map was primarily gathered by volunteers in the Cooperative Weather Observer Program. *Credit: NOAA's National Climatic Data Center*